

High temperature collective spin-photon coupling in a microwave cavity

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Abstract

An ensemble of N noninteracting spins being in thermal equilibrium and coupled to the resonant mode of a lossless microwave cavity is studied as the function of the spin temperature τ . Near $\tau = 0$ the system is known to be in a coupled spin-photon state that manifests itself by the splitting of the cavity mode (vacuum Rabi splitting). The cavity emission spectrum is simulated for arbitrary τ . A critical temperature $\tau_C = \omega_S \sqrt{N}/2$, where ω_S is the spin excitation energy, is related to the destruction of the strong coupling regime as a consequence of thermal excitations arising within the spin ensemble. © 2014 Pleiades Publishing, Ltd.

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